



REDACTED VERSION

RAILROAD COMMISSION OF TEXAS

OIL AND GAS DIVISION

June 3, 2016

Mr. Rick Dickerson
RPG Operating LLC
P.O. Box 70
McQueeney, TX 78123

Re: Release of Crude Oil on May 29, 2016 from the RPG Operating LLC (Lease: Keller, No. 17413) Tank Battery (Site)
RPG Operating LLC (P5-732193)
Lytle, Medina County, Texas
Operator Cleanup Program (OCP) No. 01-5108

Dear Mr. Dickerson:

The Railroad Commission of Texas, Site Remediation Section staff (RRC) entered the crude oil spill referenced above into the OCP. The Site is located approximately two miles north of the City of Lytle, adjacent to the (b) (6) subdivision; and specifically at latitude 29.252084 and at longitude -98.817775 (WGS 84). The Site has been assigned an OCP No. of 01-5108.

As per discussions with you on May 31, 2016, via teleconference, the current emergency response actions are being conducted in coordination with the RRC San Antonio District Office. The purpose of the emergency response action is to eliminate the source of the release in accordance with the RRC San Antonio District's requests. Once the crude oil removal action has been completed, oversight of the assessment and cleanup will transfer to the OCP. For your convenience, enclosed with this letter is OCP guidance to assist you with the environmental assessment and development of an Environmental Work Plan (Work Plan): *Suggested Deliverables and Schedule*; and, *Constituents of Concern (COCs) Guidelines for Substance Released*.

RRC OCP staff request the following:

1. Submit a Work Plan to assess affected environmental media within 30 days of this letter. The following criteria should be used, as appropriate, to develop your Work Plan:
 - a. A sufficient number of samples must be collected and analyzed for media affected by the crude oil release. The constituents of concern (COCs) are: benzene, toluene, ethylbenzene, and total xylenes (BTEX); and, total petroleum hydrocarbons (TPH). As part of the

investigation of crude oil release, soil samples exhibiting the highest TPH concentration in soils should be analyzed for polycyclic aromatic hydrocarbons (PAHs) using EPA analytical methods 8270 or 8310; and TPH using EPA analytical method 1006 to speciate the hydrocarbons (C₆-C₃₅);

- b. Identify all impacted environmental media and determine the extent of the release. Analytical results should be compared to the Texas Risk Reduction Program (TRRP) Tier 1 protective concentration levels (PCLs) provided in the enclosed guidance. Impacts should be delineated to the TRRP critical PCL or RRC guidance criteria, as applicable, for each impacted environmental medium and cleanup should be performed at the Site for COCs that exceed the applicable action level (Tier 1, RRC guidance values, etc.).
 - c. For impacts to residential property, please fully evaluate each exposure pathway including the inhalation of volatile emissions in air from soils (^{Air}Soil_{Inh-V}). If any indoor impacts are established, please assess indoor air as appropriate; and,
 - d. Outline the investigation approach, the proposed implementation schedule, and a proposed path forward.
2. Make arrangements with an environmental consultant to participate in collecting environmental samples in order to assess the effects of the crude oil release in accordance with RRC guidance and rule. Notify the OCP within 14 days of receipt of this letter the contact information for your environmental consultant;
 3. Please submit a receptor survey within 14 days of receipt of this letter. The receptor survey should include the information specified in Attachment 1 of the attached *Suggested Deliverables and Schedules* guidance.

Respond to any comments or requests within the timeframe identified in the letter. All submittals to the agency should be provided electronically with one paper copy to the Austin Site Remediation Section. Please include the OCP No. in all correspondence you may send via e-mail or postal mail to the RRC. Notify the San Antonio District Office and the Site Remediation Section in Austin at least one business week prior to beginning any field work to achieve the requirements outlined in this letter. For questions, contact me at 512-463-5983 or e-mail me at: robert.musick@rrc.texas.gov.

Sincerely,



Robert Musick P.G.
Technical Coordinator
Site Remediation Section

Enclosures: *Suggested Deliverables and Schedules*
Constituents of Concern (COCs) for Substance Released

cc: Mr. Steve Graham, Assistant District Director, RRC San Antonio District Office (e-mail)

Ms. Diane Beckham, DOCC, RRC San Antonio District Office (e-mail)

Mr. Michael Bosquez, DOCC, RRC San Antonio District (e-mail)

OCP Reading File

Mr. Pat Brawner
Medina County Health Department
709 Avenue Y
Hondo TX 78861

(b) (6)

Railroad Commission of Texas
Constituents of Concern Guidelines for Substance Released

Overview

These tables are intended for use by Railroad Commission of Texas (RRC) personnel as guidelines for the purpose of identifying constituents of concern (COCs) based on general knowledge of the substance released. The information contained in these tables does not constitute RRC rule.

Table	Title	Contains	Notes
1	Typical COCs and Analytical Methods for Different Substances Released.	COCs for different substances that could require cleanup, if released to the environment. The table includes the recommended analytical methods.	Table 1 can assist with determining a list of constituents for: <ul style="list-style-type: none"> • Site characterization; • Verification of cleanup; and, • Waste profiling. Note: Additional COCs may be required on a case-by-case basis.
2	Soil Tier 1 Human Health, Ecological Assessment, and Cleanup Values	Soil assessment and cleanup values for most COCs listed in Table 1 Can be used as screening criteria for evaluation of ecological risk	Tier 1 protective concentration levels (PCLs) are based on the lowest of all applicable human health and environmental pathways for an affected area of less than 0.5 acre. The values used in Tables 2-5 can be used to:
3	Groundwater Tier 1 Assessment and Cleanup Values	Groundwater assessment and cleanup values for most COCs listed in Table 1	<ul style="list-style-type: none"> • Specify maximum laboratory detection limits; • Quantify delineation limits; and, • Develop default cleanup goals.
4	Sediment Tier 1 Human Health, Ecological Assessment, and Cleanup Values	Sediment assessment and cleanup values for most COCs listed in Table 1 Can be used as screening criteria for evaluation of ecological risk	Tier 2 values, using site-specific data may be calculated. Site-specific data and Tier 2 calculations are subject to approval from the RRC.
5	Surface Water Tier 1 Human Health, Ecological Assessment, and Cleanup Values	Surface water assessment and cleanup values for most COCs listed in Table 1 (including fish ingestion) Can be used as screening criteria for evaluation of ecological risk	When the <i>affected surface area</i> is greater than 0.5 acre, use the 30 acre-based assessment level.
6	Texas Specific Metals Soil Background Concentrations	Median soil background concentrations	For both surface soil and subsurface soil, the naturally occurring background concentration may become the assessment level when the background concentration exceeds the human health and ecological PCLs (RG-366/TRRP-12)

Table 1. Typical Constituents of Concern and Analytical Methods for Different Substances Released ⁽¹⁾

Substance Released	Constituents of Concern	Laboratory Methods^{(2) (3)}
Crude Oil (non-sensitive site)	Total Petroleum Hydrocarbons (TPH) ^{(4) (5)}	TX1005 (C6-C35) or EPA 418.1 or EPA 1664
Crude Oil (sensitive site)	Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)	EPA 8260 or 8021B
	Polycyclic Aromatic Hydrocarbons (PAHs) ⁽⁶⁾	EPA 8270 or 8310
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664
Condensate	BTEX	EPA 8260 or 8021B
	PAHs ⁽⁶⁾	EPA 8270 or 8310 ⁽⁷⁾
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35)
Drilling Mud (water-based)	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35)
	Resource Conservation and Recovery Act (RCRA)-8 Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	pH	EPA 9040C (liquid); 9045D (soil)
	Chloride	EPA 300 ⁽¹⁰⁾
	Sodium	Sodium adsorption ratio
	Electrical Conductivity	1:1 Paste Extract
Produced Water/Brine	BTEX	EPA 8260 or 8021B
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664
	RCRA-8 Metals where groundwater is affected, or based on other process knowledge (e.g. when drilling mud is a component of the waste)	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	Chloride	EPA 300 ⁽¹⁰⁾
Frac Flowback Water	Volatile Organic Compounds (VOCs)	EPA 8260
	RCRA-8 Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C35) or EPA 418.1 or EPA 1664
	pH	EPA 9040C (liquid); 9045D (soil)
	Barium	EPA 6010 or 6020
	Chloride	EPA 300 ⁽⁹⁾
	Potassium	EPA 6010 or 6020
Drilling Mud (oil-based)	BTEX	EPA 8260 or 8021B
	PAHs ⁽⁶⁾	EPA 8270 or 8310 ⁽⁷⁾
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664
	RCRA-8 Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	pH	EPA 9040C (liquid); 9045D (soil)
	Chloride	EPA 300 ⁽¹⁰⁾
Caustic/Acid Solutions	pH	EPA 9040C (liquid); 9045D (soil)
	Chloride	EPA 300 ⁽¹⁰⁾
Tank Bottom	BTEX	EPA 8260 or 8021B
	PAHs ⁽⁶⁾	EPA 8270 or 8310 ⁽⁷⁾
	RCRA-8 Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent

		chromium ⁽⁹⁾
	pH	EPA 9040C (liquid); 9045D (soil)
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664
Pit Bottom	BTEX	EPA 8260 or 8021B
	PAHs ⁽⁶⁾	EPA 8270 or 8310 ⁽⁷⁾
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35)
	RCRA-8 Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	pH	EPA 9040C (liquid); 9045D (soil)
	Chloride	EPA 300 ⁽¹⁰⁾
Mercury Meter	Mercury ⁽⁸⁾	EPA 7471A
	pH	EPA 9040C (liquid); 9045D (soil)
Used Lubricating Oil/Motor Oil	BTEX	EPA 8021B or 8260
	Organic Halides ⁽¹¹⁾	EPA 8021B or 8260 and 8270
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664
	RCRA-8 Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	pH	EPA 9040C (liquid); 9045D (soil)
Suspected Naturally-Occurring Radioactive Materials (NORM)	Radium 226	EPA 901.1 modified for soil ⁽¹²⁾
	Radium 228	EPA 901.1 modified for soil ⁽¹²⁾
	Other Radionuclides	EPA 901.1 modified for soil ⁽¹²⁾
Glycol/Dehydrator Fluid	BTEX	EPA 8260 or 8021B
	Glycols	EPA 8015B
Amine/Gas Sweetening Fluid	BTEX	EPA 8260 or 8021B
	pH	EPA 9040C (liquid); 9045D (soil)
	Amines	Contact Laboratory - request HPIC ⁽¹³⁾
Flare Pit Soil	VOCs	EPA 8260
	SVOCs	EPA 8270
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664
	RCRA-8 Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	pH	EPA 9040C (liquid); 9045D (soil)
	Chloride	EPA 300 ⁽¹⁰⁾
	Polychlorinated Biphenyls (PCBs) ⁽¹⁴⁾	EPA 8082
Historical Lube Oil at a Gas Plant	Volatile Organic Compounds (VOCs)	EPA 8260
	Semi-Volatile Organic Compounds (SVOCs)	EPA 8270
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664
	RCRA-8 Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	pH	EPA 9040C (liquid); 9045D (soil)
	PCBs ⁽¹³⁾	EPA 8082
Transformer Oil	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35)
	PCBs ⁽¹³⁾	EPA 8082

Unidentified Waste Oil at a Gas Plant	VOCs	EPA 8260
	SVOCs	EPA 8270
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664
	Metals	EPA 6010 or 6020, 7471A for mercury ⁽⁸⁾ , 7196 for hexavalent chromium ⁽⁹⁾
	pH	EPA 9040C (liquid); 9045D (soil)
	PCBs ⁽¹³⁾	EPA 8082
Natural Gas Constituents	Dissolved natural gas constituents, methane	EPA RSK SOP 175, Iso Flask™ collection method
	BTEX	EPA 8260 or 8021B
	TPH ⁽⁴⁾⁽⁵⁾	TX1005 (C6-C12; >C12-C35) or EPA 418.1 or EPA 1664

- (1) Represents guidelines for identifying COCs based on limited information about source material. Additional information about source area/release may warrant additional constituents (e.g., PCBs at gas plants).
- (2) Verify with laboratory that method detection limits and reporting limits are below Tier 1 cleanup values. See Tables 2 and 6 for a list of Tier 1 Cleanup Values for COCs. If a COC is not listed in the tables, then a Tier 1 value is not available. Proceed with analysis using the lowest achievable detection limit.
- (3) Run toxicity characteristic leaching procedure (TCLP) analyses for benzene, metals and organic halides when profiling excavated soils for disposal.
- (4) Field tests can be substituted in accordance with SWR 91 guidance. Field testing kits may only be used to delineate TPH impacts. These TPH results should be submitted with the H-8 Form and the operator's signature will verify the sampling was performed in accordance with the proper procedures of the specific testing kit. Final closure will require a minimum of one laboratory TPH analysis to confirm impacted soil is less than 1% by weight TPH.
- (5) Request TX1006 analysis on the sample with the highest TPH (C6-C35) concentration for each source area.
- (6) Typically run PAH analysis on the sample with the highest TPH (C6-C35) concentration for COC screening.
- (7) 8310 with select ion monitoring (SIM) may be used to achieve lower detection limits.
- (8) Soils require total and TCLP mercury.
- (9) The holding time for chemical analysis of hexavalent chromium is 24 hours.
- (10) Alternative chloride methods may be used provided that the laboratory is capable of performing the method. For methods 300, 300.1 and others, dilutions are necessary for highly saline samples.
- (11) Evaluate organic halides and BTEX for used lube oil releases.
- (12) Contact laboratory to determine appropriate method for groundwater analyses based on sampling objective and desired laboratory detection limits. For drinking water, use Environmental Protection Agency (EPA) method 903.1 for Radium 226 and EPA method 904.0 for Radium 228. Use EPA Method 900.0 for gross alpha and gross beta. The results of these methods can be directly compared to maximum contaminant levels (MCLs).
- (13) HPIC = High performance ion chromatography.
- (14) Process knowledge (i.e., known date of use) may be used to exclude PCBs from COC list.

Table 2. Tier 1 Human Health and Ecological Soil Assessment and Cleanup Values

Bold values should be used for soil screening purposes and default cleanup values.

Constituent of Concern		Assessment Level ⁽¹⁻⁸⁾ Units = mg/kg (unless noted)			
		Human Health Protective Concentration Level		Ecological Benchmarks	
		GW Soil	Tot Soil Comb	Earth-worms	Plants
BTEX	Benzene	0.026	120	--	--
	Toluene	8.2	5,900	--	200
	Ethylbenzene	7.6	6,400	--	--
	Xylenes	120	6,000	--	--
TPH	C6-C12 (TX1005)	65	1,600	--	--
	>C12-C35 (TX1005)	200	2,300	--	--
	TPH (Rule 91)	10,000	10,000	--	--
PAHs	Acenaphthene	240	3,000	--	20
	Acenaphthylene	410	3,800	--	--
	Anthracene	6,900	18,000	--	--
	Benzo(a)anthracene	18	5.7	--	--
	Benzo(a)pyrene	7.6	0.56	--	--
	Benzo(b)fluoranthene	60	5.7	--	--
	Benzo(g,h,i)perylene	46,000	1,800	--	--
	Benzo(k)fluoranthene	620	57	--	--
	Chrysene	1,500	560	--	--
	Dibenzo(a,h)anthracene	9.5	0.55	--	--
	Fluoranthene	1,900	2,300	--	--
	Fluorene	300	2,300	30	--
	Indeno(1,2,3-cd)pyrene	170	5.7	--	--
	Naphthalene	31	220	--	--
	Phenanthrene	420	1,700	--	--
	Pyrene	1,100	1,700	--	--
METALS	Arsenic ⁽⁶⁾	5	24	60	18
	Barium ⁽⁶⁾	440	8,100	330	500
	Cadmium	1.5	52	140	32
	Chromium (total) ⁽⁶⁾	2,400	33,000	0.4	1
	Chromium (trivalent)	2,400	33,000	--	--
	Chromium (hexavalent)	28	120	--	--
	Lead ⁽⁶⁾	3.0	500	1700	120
	Mercury(pH=4.9) ⁽⁶⁾	0.0078	3.6	0.1	0.3
	Mercury(pH=6.8) ⁽⁶⁾	2.1	8.3	--	--
	Selenium ⁽⁶⁾	2.3	310	70	1
	Silver	0.48	97	--	2

PCBs	Total PCBs	11	1.1	--	40
GLYCOLs	Ethylene glycol	94	130,000	--	--
AMINES	Diethanolamine	0.023	33	--	--
	Triethanolamine	9.4	13,000	--	--
NORM	Radium 226	30 picocuries/g		--	--
	Radium 228	30 picocuries/g		--	--
	Other radionuclides	150 picocuries/g		--	--
	Chloride	3,000 ⁽⁹⁾			
	Electrical Conductivity	⁽¹⁰⁾			
	Methane, Soil Gas	10,000 ppm ⁽¹¹⁾			

- (1) With exception of TPH (SWR 91) and Radioactivity, the Tier 1 human health values listed above are derived from the TRRP table of Tier 1 (PCLs for soil based on residential land use assumptions for 0.5 acre source area, dated May 2011 (30TAC350.71K). (<http://www.tceq.state.tx.us/remediation/trrp/trrppcls.html>)
- (2) Tier 2 ^{GW}Soil PCLs can be modified with site-specific information such as depth to groundwater, soil pH, and soil type. For assistance in developing Tier 2 values contact Site Remediation.
- (3) Bold values should be used for soil screening purposes and default cleanup values.
- (4) ^{GW}Soil is the PCL for surface and subsurface soil to protect groundwater.
- (5) ^{Tot}Soil_{Comb} is the surface soil PCL for combined soil ingestion, dermal contact, inhalation of volatiles and particulates, and ingestion of aboveground and belowground vegetables.
- (6) Texas-specific background concentrations for arsenic (5.9 mg/kg), barium (300 mg/kg), total chromium (30 mg/kg), lead (15 mg/kg), mercury (0.04 mg/kg), and selenium (0.3 mg/kg) can be used as Tier 1 values if the values listed above are less than background (30TAC350.75).
- (7) The ecological values listed above are derived from TCEQ (January 2006) *Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised)*. Remediation Division. (<http://www.tceq.state.tx.us/remediation/trrp/guidance.html>)
- (8) -- indicates that a screening value is not currently available.
- (9) A recommended level based on RRC Field Guide for the Assessment and Cleanup of Produced Water Releases.
- (10) If background is not known and EC is measured instead of chloride, the following EC values may be used as delineation criteria, depending on site-specific vegetative cover:
- 0-2 millimhos per centimeter (mmhos/cm) – no effect on plant life
 - 2-4 mmhos/cm – slight effect on plant life (consistent with Rule 8 guidelines)
 - 4-8 mmhos/cm – moderate effect on plant life
 - 8-16 mmhos/cm – only tolerant plants yield well
 - >16 mmhos/cm – only very tolerant plants yield well

Note: EC equal to or below 8 mmhos/cm is expected to not exceed 3,000 mg/kg chloride

- (11) Soil gas value derived from U.S. Department of the Interior's Office of Surface Mining's *Technical Measures for Investigation and Mitigation of Fugitive Methane Hazards in Areas of Coal Mining*, dated September 2001.

Table 3. Tier 1 Human Health Groundwater Assessment and Cleanup Values

Constituent of Concern		Tier 1 Protective Concentration Level ⁽¹⁻⁵⁾ Units = mg/L (unless noted)
		^{GW} GW _{Ing}
BTEX	Benzene	0.005
	Toluene	1
	Ethylbenzene	0.7
	Xylenes	10
TPH	>C8-C10 (Aromatics)	0.98 ⁽⁶⁾
	>C12-C16 (Aromatics)	0.98 ⁽⁶⁾
PAHs	Acenaphthene	1.5
	Acenaphthylene	1.5
	Anthracene	7.3
	Benzo(a)anthracene	0.0013
	Benzo(a)pyrene	0.0002
	Benzo(b)fluoranthene	0.0013
	Benzo(g,h,i)perylene	0.730
	Benzo(k)fluoranthene	0.013
	Chrysene	0.130
	Dibenzo(a,h)anthracene	0.0002
	Fluoranthene	0.98
	Fluorene	0.98
	Indeno(1,2,3-cd)pyrene	0.0013
	Naphthalene	0.49
	Phenanthrene	0.73
	Pyrene	0.73
METALS	Arsenic	0.01
	Barium	2
	Cadmium	0.005
	Chromium (total)	0.1
	Chromium (trivalent)	0.1
	Chromium (hexavalent)	0.1
	Lead	0.015
	Mercury (pH = 4.9)	0.002
	Mercury (pH = 6.8)	0.002
	Selenium	0.05
	Silver	0.12
PCBs	PCBs	0.0005
GLYCOLS	Ethylene glycol	49
AMINES	Diethanolamine	0.012
	Triethanolamine	4.9

NORM ⁽⁶⁾	Radium 226/228	5 picocuries/L ⁽⁷⁾
	Other radionuclides	15 picocuries/L
	Chloride ⁽³⁾	300 ⁽⁸⁾
	Sodium	20 ⁽⁹⁾
	Sulfate	300 ⁽⁸⁾
	pH	>7.0 (unitless)
	Methane, Dissolved	10 ⁽¹⁰⁾

- (1) The Tier 1 values listed above are derived from the TRRP Tier 1 PCLs for groundwater ingestion based on residential use assumptions, dated November 2014 (per 30TAC350.71K). (<http://www.tceq.state.tx.us/remediation/trrp/trrppcls.html>).
- (2) Unless the groundwater is determined to be Class 2 or 3, or only "saturated soil," select PCLs based on Class 1 groundwater classification.
- (3) Regardless of groundwater classification, the RRC suggests determination of the background concentration for chloride. Please contact Site Remediation in Austin for assistance in developing site-specific groundwater cleanup values.
- (4) ^{GW}GW_{ing} is the PCL for ingestion of groundwater.
- (5) --- indicates that a Tier 1 screening value is not currently available.
- (6) TX1005 laboratory detection limit may exceed this value. Assessment and/or cleanup may default to laboratory detection limit with RRC staff approval.
- (7) For drinking water, use EPA method 903.1 for Radium 226 and EPA method 904.0 for Radium 228. Use EPA Method 900.0 for gross alpha and gross beta. The results of these methods can be directly compared to MCLs.
- (8) Texas Secondary Drinking Water Standards (per 30 TAC§290.105(b))
- (9) EPA does not mandate a maximum level of sodium permitted in public water supplies. This value was developed for those individuals restricted to a total sodium intake of 500 mg/day. February 2003 *Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Sodium*.
- (10) Recommended action level for dissolved methane in water. The value is derived from U.S. Department of the Interior's Office of Surface Mining's *Technical Measures for Investigation and Mitigation of Fugitive Methane Hazards in Areas of Coal Mining*, dated September 2001.

Table 4. Tier 1 Human Health and Ecological Sediment Assessment and Cleanup Values
Ecological pathways evaluated on a case-by-case basis.

Constituent of Concern		Assessment Levels ⁽¹⁻⁴⁾ Units = mg/kg (unless noted)		
		Human Health Protective Concentration Level	Ecological Benchmarks	
			Freshwater	Saltwater
BTEX	Benzene	990	0.16	0.14
	Toluene	59,000	2.88	0.94
	Ethylbenzene	73,000	2.86	0.65
	Xylenes	150,000	4.00	2.54
TPH	C6-C12 (TX1005)	---		---
	>C12-C35 (TX1005)	---		---
	TPH (Rule 91)	---	---	---
PAHs	Acenaphthene	7,400	0.0067	0.016
	Acenaphthylene	7,400	0.0059	0.044
	Anthracene	37,000	0.0572	0.0853
	Benzo(a)anthracene	16	0.108	0.261
	Benzo(a)pyrene	1.6	0.150	0.43
	Benzo(b)fluoranthene	16	---	---
	Benzo(g,h,i)perylene	3,700	---	---
	Benzo(k)fluoranthene	160	---	---
	Chrysene	1,600	0.166	0.384
	Dibenzo(a,h)anthracene	1.6	0.033	0.0634
	Fluoranthene	4,900	0.423	0.6
	Fluorene	4,900	0.0774	0.019
	Indeno(1,2,3-cd)pyrene	16	---	---
	Naphthalene	2,500	0.176	0.160
	Phenanthrene	3,700	0.204	0.24
	Pyrene	3,700	0.195	0.665
METALS	Arsenic	110	9.79	8.2
	Barium	23,000	---	---
	Cadmium	1,100	0.99	1.2
	Chromium (total)	36,000	43.4	81
	Chromium (trivalent)	---	---	---
	Chromium (hexavalent)	140	---	---
	Lead	500	35.8	46.7
	Mercury (pH =4.9)	34	0.18	0.15
	Selenium	2,700	---	---
	Silver	350	1.0	1.0
PCBs	Total PCBs	2.3	0.0598	0.0227
GLYCOLS	Ethylene glycol	310,000	---	---

AMINES	Diethanolamine	77	---	---
	Triethanolamine	31,000	---	---
NORM	Radium 226	---	---	---
	Radium 228	----	---	---
	Other radionuclides	----	---	---

- (1) The Tier 1 values listed above are derived from the TRRP table of Tier 1 Protective Concentration Levels (PCLs) for sediment, dated March 31, 2006 (per 30TAC350.71K). (<http://www.tceq.state.tx.us/remediation/trrp/guidance>)
- (2) $TotSed_{Comb}$ is the sediment PCL for combined sediment ingestion, dermal contact, and ingestion of freshwater fish.
- (3) The ecological values listed above are derived from TCEQ (January 2006) *Update to Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas RG-263 (Revised)*. Remediation Division. (<http://www.tceq.state.tx.us/remediation/trrp/guidance.html>)
- (4) --- indicates that a Tier 1 screening value is not currently available.

Table 5. Tier 1 Human Health and Ecological Surface Water Assessment and Cleanup Values

Ecological pathways evaluated on a case-by-case basis.

Constituent of Concern		Assessment Levels ⁽¹⁻⁴⁾ Units = mg/L (unless noted)				
		Tier 1 Human Health Risk-Based Exposure Levels (RBELs)			Ecological Benchmarks	
		^{SW} RBELs				
		Water and Freshwater Fish	Freshwater Fish Only	Saltwater Fish Only	Freshwater	Saltwater
BTEX	Benzene	0.005	0.513	0.513	0.130	0.109
	Toluene	1.0	15	15	1.45	0.48
	Ethylbenzene	0.7	7.143	7.143	1.09	0.249
	Xylenes	---	---	---	1.34	0.85
TPH	>C8-C10 (Aromatics)	---	---	---	---	---
	>C12-C16 (Aromatics)	---	---	---	---	---
PAHs	Acenaphthene	0.67	0.99	0.99	0.023	0.0404
	Acenaphthylene	---	---	---	---	---
	Anthracene	5.6	40	40	0.0003	0.00018
	Benzo(a)anthracene	6.8E-5	3.3E-4	3.3E-4	0.0346	---
	Benzo(a)pyrene	6.8E-5	3.3E-4	3.3E-4	0.000014	---
	Benzo(b)fluoranthene	3.8E-5	1.8E-4	1.8E-4	---	---
	Benzo(g,h,i)perylene	---	---	---	---	---
	Benzo(k)fluoranthene	3.8E-5	1.8E-4	1.8E-4	---	---
	Chrysene	0.068	0.327	0.327	0.007	---
	Dibenzo(a,h)anthracene	3.8E-5	1.8E-4	1.8E-4	0.005	---
	Fluoranthene	0.130	0.140	0.140	0.00616	0.00296
	Fluorene	1.1	5.3	5.3	0.011	0.05
	Indeno(1,2,3-cd)pyrene	3.8E-5	1.8E-4	1.8E-4	---	---
	Naphthalene	---	---	---	0.25	0.125
	Phenanthrene	---	---	---	0.030	0.0046
	Pyrene	0.83	4.0	4.0	0.007	0.00024
METALS	Arsenic	0.01	0.01	0.01	0.150	0.078
	Barium	2.0	---	---	16	25
	Cadmium	0.005	---	---	0.00015	0.00875
	Chromium (total)	0.1	---	---	---	---
	Chromium (trivalent)	0.1	---	---	0.042	0.103
	Chromium (hexavalent)	0.062	0.502	0.502	0.0106	0.0496
	Lead	0.00115	0.00383	0.00383	0.00117	0.0053
	Mercury	2.1E-5	2.1E-5	2.1E-5	0.0013	0.0011
	Selenium	0.05	4.2	4.2	0.005	0.136
Silver	---	---	---	0.00008	0.0002	

PCBs	PCBs	6.4E-7	6.4E-7	6.4E-7	1.4E-5	3.0E-5
GLYCOLS	Ethylene glycol	---	---	---	---	---
AMINES	Diethanolamine	---	---	---	---	---
	Triethanolamine	---	---	---	---	---
NORM	Radium 226/228	---	---	---	---	---
	Other radionuclides	---	---	---	---	---

(1) The Tier 1 values listed above are derived from the TRRP table of Tier 1 PCLs for surface water, dated January 2011 (per 30TAC350.71K). (<http://www.tceq.state.tx.us/remediation/trrp/guidance.html>)

(2) ^{SW}RBEL is the surface water risk-based exposure level for ingestion of water and freshwater fish; ingestion of freshwater fish; and ingestion of saltwater fish.

(3) The ecological values listed above are chronic values derived from TCEQ (January 2011) *Aquatic Life RBELs tables* (<http://www.tceq.state.tx.us/remediation/trrp/guidance.html>)

(4) --- indicates that a Tier 1 screening value is not currently available.

Table 6. Texas Specific Soil Background Concentrations (mg/kg) ⁽¹⁾

Metal	Median Background Concentration (mg/kg)
Aluminum	30,000
Antimony	1
Arsenic	5.9
Barium	300
Beryllium	1.5
Boron	30
Total Chromium	30
Cobalt	7
Copper	15
Fluoride	190
Iron	15,000
Lead	15
Manganese	300
Mercury	0.04
Nickel	10
Selenium	0.3
Strontium	100
Tin	0.9
Titanium	2,000
Thorium	9.3
Vanadium	50
Zinc	30

(1) Source: "Background Geochemistry of Some Rocks, Soils, Plants, and Vegetables in the Conterminous United States", by Jon J. Connor, Hansford T. Shacklette, et al., Geological Survey Professional Paper 574-F, US Geological Survey.

SUGGESTED DELIVERABLES AND SCHEDULES

Operator Cleanup Program

GOAL: To have a RRC-approved Remediation Plan six months after initial release is reported to Site Remediation

DELIVERABLE
Notification and description of the release and summary of emergency cleanup, including operator name and contact, lat/long location of the site, Initial Soil and Groundwater Sampling Results (if applicable), H8 Form if applicable,
Site Investigation Report: <ol style="list-style-type: none">1) Description and history of the release and summary of emergency cleanup activities, if applicable;2) Identification of constituents of concern (COCs) and brief description of site assessment methodology;3) Vertical and horizontal delineation of COCs in all media¹;4) Data Screening Evaluation:<ol style="list-style-type: none">a) land use assumptions and size of impacted area;b) receptor survey results (Attachment 1);c) groundwater classification;and,<ol style="list-style-type: none">d) summary tables of analytical results including risk-based or background delineation criteria.5) Comparison of affected media with delineation criteria (tabulated analytical data);6) Closure objectives;7) Recommendations;8) Schedule of proposed activities to achieve closure objectives;9) Location map on topographic base (1:2,000) and Site Map showing sample locations; maps must contain a north arrow, correlating map scale and legend identifying symbols etc.10) Supporting documentation such as soil boring logs, monitor well installation reports, analytical data, QA/QC reports, etc.11) Professional Geoscientists seals are to be provided as required by law on reports submitted to the Site Remediation Section.

DELIVERABLE

Groundwater Monitoring Reports

If groundwater is impacted, periodic sampling is required as outlined in a Remedial Action Plan (RAP).

Include the following:

Rationale for sampling schedule (for new releases, quarterly sampling is suggested);

Groundwater classification demonstration, if applicable;

Chronological summary tables of the gauging & sampling data for each well;

Well Gauging Table- Include lat/long location, total depth, elevation top casing, chronological depth to water, chronological groundwater elevation, amount of phase separated hydrocarbons, if present;

Groundwater gradient maps with date of gauging posted;

COC concentration maps, supporting analytical data, etc.

Remedial Action Plan:

- 1) Summary of all interim remediation measures, remediation objectives and cleanup goals;
- 2) Site-specific data that demonstrate planned remedial action;
- 3) Discussion of anticipated effectiveness of planned remedial action;
- 4) Air and/or surface water permits, if applicable;
- 5) Technical impracticability demonstration, if applicable;
- 6) Summary of institutional controls including landowner concurrence, if applicable;
- 7) Schedule to implement remaining work and site closure;
- 8) Post-response actions (if applicable); and,
- 9) Environmental deed restriction language, if applicable.

Remedial Action Completion Report and Closure Request

- 1) Summary of cleanup activities including volumes treated and disposed.
- 2) Environmental deed restriction filed with the county of record, if applicable,
- 3) Monitor well plugging reports (with RRC pre-approval)

Notes:

1. Horizontal and Vertical Delineation

COCs should be horizontally delineated to Tier 1 residential human health PCLs, ecological screening benchmarks, MQL or background concentrations, regardless of property use. Use of commercial/industrial PCLs are acceptable provided that appropriate institutional controls are established for the affected property. Offsite COCs should be delineated laterally to residential PCLs regardless of land use designation. COCs should be delineated vertically to background levels or to the sample quantitation limit (SQL) if groundwater is not evaluated.

Attachment 1

Receptor Survey

ALL SITES

The receptor survey should identify all potential receptors with imminent and immediate health risks. The survey shall include a location map on a topographic base with residences, churches, parks and schools indicated within 1/2 mile of the perimeter of the site. The map should also identify the location of any onsite monitor wells. It may also be appropriate to evaluate the potential for vapor risk, based on the contaminants present.

GROUNDWATER IMPACTS

If groundwater is suspected to be impacted, the survey should also include a map showing the location of all registered water wells within a 1/2 mile radius and unregistered water wells within a 1/4 mile radius around the site. Unregistered water wells may be located by performing a walking reconnaissance. The report should include an explanation of whether the wells would be vulnerable to contamination and determine the potential to impact underground utilities. Copies of the water well registration forms may contain some of this information and are helpful for this purpose.

SURFACE WATER IMPACTS

In addition to the information above, if surface water has been impacted, the receptor survey should indicate all water intakes present within 1/2 mile downstream of the farthest extent of the released material.

RRC Facility Information Form

Site Name:

County:

FACILITY ASSOCIATED WITH RELEASE

Organization P-5 No.:

P-5 Operator Name:

Company Address:

City, State, Zip:

Phone No.:

Permitted Facility (Provide all permit numbers that apply)

P-4 Lease or ID No. if pollution associated with a well, tanks, flow lines, etc. on a lease, (Include District No. with Oil Lease No.):

T-4 Permit No. if pollution associated with pipeline:

R-3 Serial No. if pollution associated with a gas plant or other type plants, cycling, drip, scrubbers, separators, dehydrators, etc.:

R-2 Serial No. if pollution associated with reclaiming or treating plant:

P-18 Serial No. if pollution associated with skimming facility at a disposal well:

T-1 Registration No. if pollution associated with crude or condensate storage facility:

H-11 Permit No. if pollution associated with pit:

Other:

Date Release was discovered:

Operator Name and Operator's P-5 No. at time release was discovered (if different from above):

Attach H-8 Spill Release Form (if applicable):

Please provide latitude longitude location of release and method for determining location:

Primary Contact person with telephone number:

Secondary/Courtesy Copy to:

Future Contact Information Regarding Cleanup (if different then primary contact